Attorney Docket No. 32978

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

EL 148711215US

Nonprovisional Patent Application

of

Frank N. Blundo

for

APPARATUS AND METHOD FOR FRAMING AND ISOLATING WINDOW AND DOOR OPENINGS OF A BUILDING

P:\data\Blundo\32978\Regular\pto\appcover

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

APPARATUS AND METHOD FOR FRAMING AND ISOLATING WINDOW AND DOOR OPENINGS OF A BUILDING

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a nonprovisional patent application claiming priority of provisional application for patent No. 60/431,408, filed December 6, 2002.

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

This invention relates to building construction and in particular to an apparatus and method of framing window and door openings of a building to eliminate air and water from penetrating the building by providing a common frame having channels for receiving various types of flanges to accommodate various size structures in order to isolate the building openings from the wall cavity.

DESCRIPTION OF RELATED ART

All building construction from the beginning of time has incorporated in the structure, punched openings. Energy and cost efficiency were ignored in the past and still are products of waste. The wall cavity of the building or structure is often mistaken for dead space and the cavity has mistakenly been used as a downspout or water shed in which mold and decay thrive. Effective

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

treatment of such cavity requires that absolutely no water be allowed to enter this area by isolating all openings from the wall cavity thus avoiding the problems of condensation and air turbulence within the cavity.

U.S. Patent No. 2,326,549, issued August 10, 1943 to Edgar P. Miller, discloses a building having a window opening and a frame adapted for easy and accurate installation to retain its original shape in a wall structure throughout the life of the building, to provide a frame by which a masonry wall is adapted to be automatically plumbed, and to provide a frame equipped with unitary plaster and stucco grounds and arranged for effecting a weather-tight seal. The frame comprises side jambs, header jamb, and a sill. This design provides drainage channels whereby any moisture which might seep into the walls may readily drain therethrough and discharge through outlets at the lower ends of the side jambs. In climates that cause metal frames or windows to sweat and moisture to collect on the sill of the windows, a drain is provided comprising an opening in a member located on a level with the sill of the frame and is connected by a tube with the drainage channels. This invention discloses a window-frame construction having a non-thermal residential glazing adapter, but it does not

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

tie into an air-moisture barrier and would not be code compliant today.

U.S. Patent No. 6,256,956 (B1), issued July 10, 2001 to Lawrence R. Davis, discloses a moisture and air resistant wrap for windows and doors having improved installation and sealing characteristics comprising a capsule portion and flange portion, and insulating material encapsulated in the capsule portion. However, the capsule is not fixed to studs, frame, or jambs, and it floats free to allow for window adjustment. This invention is not suitable for use with metal structures because it can be easily punctured, and it is primarily intended for a wood frame cavity in residential applications.

U.S. Patent No. 4,219,971, issued September 2, 1980 to Curtis Mauroner, discloses a multi-sash pocket window designed to accommodate sash of differing widths and in varying combinations. The window frame structure is adapted to receive inserts for retaining the sash in place and which are selected to accommodate the sash width and various combinations being used. An important feature of this patent is to permit changes in the number or type of sash used within a given supporting structure of a sliding window without the necessity of replacing any section of

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

the supporting frame which is affixed to the window opening. However, this invention is for use with basic residential framing with no wall cavity, and does not provide for eliminating air and water from penetrating a building.

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

SUMMARY OF THE INVENTION

Accordingly, it is therefore an object of this invention to provide framing for window and door cavities of a building in order to isolate the building structure from said cavities and prevent the formation of mold and decay.

It is another object of this invention to provide a panel component having one or more channels on one side for receiving a flange of various designs.

It is another object of this invention to provide flanges of different designs for inserting into one or more channels of the panel to accommodate structural setback requirements from an outer edge of a frame formed by a plurality of panels.

These and other objects are accomplished by a panel for framing an opening of a building to eliminate air and water penetration comprising at least one channel positioned on a side of the panel for receiving a flange, the channel extending the length of the panel, a thermally nonconducting section of the panel located adjacent to the channel and extending the length of the panel, an end section of the panel having a first end attached to the thermally nonconducting section and

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

extending the length of the panel, and a second opposite end of the end section having an elongated slot. The channel comprises retainer edges for retaining the flange inserted into the channel. The panel comprises the flange inserted into the channel, the flange having a right angle extending section positioned in accordance with a predetermined setback distance from the end section. The flange comprises a first section and a second section, the second section extending from the first section to form a right angle. The flange may also comprise an offset flange having a first section, a second section and a third section, the second section branching from the first section and extending parallel to the first section, the third section forming a right angle with an end of the second section. Further, the flange may comprise a first section and a second section, the second section branching from the first section and extending in an opposite direction a predetermined distance parallel to the first section. An end of the panel comprises predetermined spaced apart openings for receiving screws for interconnecting the panels at right angles.

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

The objects are further accomplished by a method of forming a panel comprising the steps of forming the panel by an extruding process, the panel having at least one channel and one slot parallel to the channel, inserting a thermally nonconducting material into the slot near a first end of the panel, which hardens in place, and cutting the panel on an opposite side of the slot adjacent to the thermally nonconducting material and along the length of the panel wherein a major portion of the panel is thermally isolated from the first end of the panel.

The objects are further accomplished by a panel for framing an opening of a building to eliminate air and water penetration comprising a first side of the panel having a first channel and a second channel, the second channel being adjacent to the first channel, and the first channel and the second channel extending the length of the panel, a thermally nonconducting section of the panel located adjacent to the first channel and extending the length of the panel, and an outer end section of the panel having a first end attached to the thermally nonconducting section and extending the length of the panel, and a second opposite end of the end section

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

having an elongated slot. Each of the first channel and the second channel comprises retainer edges for retaining a flange inserted into the first channel or the second channel. The panel comprises a flange inserted into the first channel or the second channel in accordance with a predetermined setback distance from a reference point on the outer end section. The flange comprises a first section and a second section, the second section extending from the first section to form a right angle. The flange also comprises an offset flange having a first section, a second section and a third section, the second section branching from the first section at a right angle and extending parallel to the first section, the third section forming a right angle with an end of the second section. Further, the flange may comprise a first section and a second section, the second section branching from the first section and extending in an opposite direction a predetermined distance parallel to the first section.

The objects are further accomplished by a frame for an opening of a building to eliminate air and water penetration of the building comprising a plurality of panels each of the panels having at least one channel for

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

inserting a flange, a first pair of the panels being spaced apart and positioned parallel to each other in a first direction, a second pair of the panels being spaced apart and positioned parallel to each other in a second direction within the first pair of the panels wherein each of the panels forms a right angle between one of the panels of the first pair and one of the panels of the second pair, and means for attaching the second pair of the panels to the ends of the first pair of the panels. Each of the flanges inserted in the first pair of panels abut the ends of each of the flanges inserted in the second pair of panels. The channel comprises retainer edges for retaining the flange inserted into the channel. Each of the panels comprises the flange inserted into the channel, the flange having a right angle extending section positioned in accordance with a predetermined setback distance from a reference point on an outer end section of the panels. The flange comprises a first section and a second section, the second section extending from the first section to form a right angle. The flange also comprises an offset flange having a first section, a second section and a third section, the second section branching from the first section and extending

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

parallel to the first section, the third section forming a right angle with an end of the second section. Further, the flange may comprise a first section and a second section, the second section branching from the first section and extending in an opposite direction a predetermined distance parallel to the first section. An end of each of the panels comprises predetermined spaced apart openings for receiving screws for interconnecting the panels at right angles.

Additional objects, features and advantages of the invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiments exemplifying the best made of carrying out the invention as presently perceived.

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

BRIEF DESCRIPTION OF THE DRAWINGS

The appended claims particularly point out and distinctly claim the subject matter of this invention. The various objects, advantages and novel features of this invention will be more fully apparent from a reading of the following detailed description in conjunction with the accompanying drawings in which like reference numerals refer to like parts, and in which:

FIG. 1 is a front perspective view of a panel having at least one channel according to the present invention;

FIG. 2 is a front perspective view of a right-angle flange according to the present invention;

FIG. 3 is a front perspective view of an offset right-angle flange according to the present invention;

FIG. 4 is a front perspective view of a sill flange according to the present invention;

FIG. 5 is a perspective view of the panel of FIG. 1 arranged to frame an opening of a building according to the present invention;

FIG. 6 is a perspective view of the panel with the right-angle flange of FIG. 15 showing building materials arranged adjacent to the frame;

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

FIG. 7 is a top view of the panel of FIG. 6 having the right angle flange of FIG. 15 inserted into the second channel showing the placement of moisture barrier material and sealant points;

FIG. 8 is a top view of a panel after it is produced by an extrusion process showing a continuous path of material from one end to the other end;

FIG. 9 is a top view of the panel after a thermally, nonconducting material has been inserted into space 31 in FIG. 8 along the complete length of the panel;

FIG. 10 is a top view of the panel after the thermally conducting material of the panel is cut-away from above the space filled with thermally nonconducting material;

FIG. 11 is a top view of a panel showing a bracket attached to a front end of the frame for receiving a pressure cap;

FIG. 12 is a top view of a panel having a right-angle flange of FIG. 2 inserted into a first channel to provide a one inch setback;

FIG. 13 is a top view of a panel having the right-angle flange of FIG. 2 and inserted into the first channel to provide a two inch setback;

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

FIG. 14 is a top view of a panel having the right-angle flange of FIG. 2 inserted into a second channel to provide a three inch setback;

FIG. 15 is a top view of a panel having the right-angle flange of FIG. 2 and inserted into the second channel to provide a four inch setback;

FIG. 16 is a top view of a panel having the offset right-angle flange of FIG. 3 inserted into the second channel to provide a five inch setback;

FIG. 17 is a top view of a panel having the offset right-angle flange of FIG. 3 inserted into the first channel to provide a flush surface with no setback; and

FIG. 18 is an end view of a panel having the sill flange of FIG. 4 inserted into the first channel to provide a surface for a sill attachment.

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

Referring to Figure 1, a front perspective view of a panel 10 according to the present invention is shown comprising two parallel channels 20, 26 on a front surface 21. The channel 20 comprises retainer edges 22, 24 for retaining a flange 12, 14, 16 (FIGS. 2-4) within the channel 20. Likewise, channel 26 comprises retainer edges 28, 30 for retaining a flange 12, 14, 16 within the channel 26. One side of a thermal barrier 32 is attached adjacent to channel 26 and the other side of thermal barrier 32 is attached to an inner side of an outer end section 34. The outer side of the outer end section 34 comprises a threaded inner area 35 running the length of the panel 10 for securing the panels 10 together. A rear surface 23 of panel 10 is flat. Panels 10 are arranged to form frames for insertion in openings of a building.

Referring to FIG. 2, FIG. 3 and FIG. 4, FIG. 2 is a front perspective view of a right-angle flange 12, FIG. 3 is a front perspective view of an offset right-angle flange 14, and FIG. 4 is a front perspective view of a sill flange 16 according to the present invention. Each of the flanges 12, 14, 16 is provided for insertion into one of the channels 20, 26 depending on the application

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

requirements of a combination of panels 10 and flanges 12, 14, 16, such as a frame 18 (FIG. 5) of a window opening in a building. Further, each panel 10 and flange 12, 14, 16 may be embodied with aluminum similar to panel 10. When a channel 20, 26 receives a flange 12, 14, the orientation of the flange is determined by a predetermined setback distance requirement measured from approximately one-quarter inch back from the edge 35 of the outer end section 34 of panel 10 to the protruding section of the flange 12, 14 extending away from the surface of panel 10. Five different setbacks are provided from one inch to five inches depending on which channel 20, 26 is used and the orientation of flange 12, 14.

Referring to FIG. 2, the right angle flange 12 comprises section 40 and section 42 which are at right angles to each other, and section 42 is positioned at a distance 44 from the edge of section 40 in order to clear retainer edges 22, 24 of channel 20 or retainer edges 28, 30 of channel 26 depending on the orientation of the flange 12 when inserted into either one of the channels 20, 26. The width of section 42 may vary depending on application requirements. The width of section 40 is

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

determined by the inside width of the channels 20, 26 in which it is inserted.

Referring to FIG. 3, the offset right-angle flange 14 comprises sections 50, 52, 54. Section 52 is offset a small distance sufficient to clear the outside of retainer edge 22 when flange 14 is inserted into channel 20 and extends parallel to section 50 forming a right-angle flange with section 54. When inserted into channel 20, flange 14 provides a five inch setback from point "S" (FIG. 16) on the outer end section 34 of panel 10.

Referring to FIG. 4, the sill flange 16 comprises sections 60, 62, and 64. Section 60 is for insertion into the channel 26 of panel 10 so that section 62 extends outwardly beyond the front edge of panel 10 to form a sill 62 as shown in FIG. 5. Section 62 is offset a distance from section 60 to clear retainer edge 30 of channel 26 and extends parallel to section 60 in the opposite direction forming the sill 62 when attached to a bottom panel 10 of a window frame 18.

Referring to FIG. 5, a perspective view of a frame 18 is shown comprising a plurality of panels 10_1, 10_2, 10_3 and 10_4, arranged at right angles to each other to form four sides of the frame 18. Each of the panels 10_1 to 10_3

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

comprises a flange 12_1, 12_2, 12_3 inserted into channel 26 on each panel 10_1-10_3. Panel 10_4 comprises a sill flange 16 inserted into channel 26 and the sill section 62 can be seen extending beyond the panel 10_4 (see FIG. 4). When a sill flange 16 is not used, then channel 26 of panel 10_4 may have a flange 12_1, 12_2, 12_3. The flange 12_2 on top has a length equal to the length of panel 10_2 plus the net width of panels 10_1 and 10_3 on each side so that the upper portion of flange 12_2 butts up against side flanges 12_1 and 12_3. This is accomplished by providing notches 15, 17 in section 42 on each end of the flange 12_2. Frame 18 is used to line an opening of a building in order to seal the wall cavities of the building to be free from water during and after construction phase, thereby preventing the formation of mold and decay in the wall cavities.

Panel 10_4 not only comprises the sill flange 16 inserted in channel 26, but also comprises the offset right-angle flange 14 (FIG. 3) inserted in channel 20 so that it provides the same setback as if flange 12 was inserted in channel 26 as shown in FIG. 12.

The upper panel 10_2 fits between side panels 10_1 and 10_3 and it is secured by screws 46, 47, 48 inserted through side panels 10_1 and 10_3 and into the ends of panel

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

10_2 which has slots or screw races 35, 39 and 37 for receiving the screws 46, 47, 48 respectively. Screw 46 is inserted through the side of outer end section 34 of panels 10_1 and 10_3 and into the threaded inner area 35 of section 34 for securing the panels together. The screws 46, 47, 48 may be embodied by number eight (8) buttonhead or truss head phillip screws which are inserted into a number seven (7) drilled hole and aligned with the screw races 35, 39, 37 at the end of panels 10_2 and 10_4. The joints between the top panel 10_2 and side panels 10_1 and 10_3 are caulked to seal out moisture. The lower panel 10_4 similarly fits between side panels 10_1 and 10_3 and it is similarly secured by screws inserted through side panels 10_1 and 10_3. The joints between the bottom panel 10_4 and side panels 10_1 and 10_3 are caulked to seal out moisture. The joints 44, 45 where top flange 12_2 meets the side flanges 12_1 and 12_3 are sealed with a commonly known caulking material such as industrial silicone.

When the frame 18 is positioned within a window opening of a building, it is secured by a plurality of screws. The flanges 12_1 to 12_4 comprise a series of spaced-apart holes 13 approximately sixteen inches on center for receiving number ten (10) truss head screws

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

having a length as required for structural integrity. The panels 10_1 to 10_4 comprise a series of spaced-apart countersunk holes 19 which are approximately sixteen inches on center for insertion from the inside of the frame 18 of number twelve (12) flat head screws with a length as required for structural integrity. The first hole 19 in the panels 10_1 to 10_4 is typically spaced approximately four or six inches 86, 87 from an end of the flanges and the holes 13, 19 are spaced 92, 93 three-quarter inches in (to the hole center) from an outer edge of the flanges 10_1 to 10_4.

The frame 18 is designed for new building construction and it is adaptable for old building remodeling. It is resistant to internal and external blowout and ballistic assault, in addition to being hurricane proof and provides resistance to damage by earthquakes.

The present invention as embodied by frame 12 in a building is intended to meet or exceed a plethora of building codes and specifications. For example, in regard to air and water penetration, the frame 12 when installed in a building according to the present invention complies with Massachusetts State Board of

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

Building Regulations and Standards 780 CMR 1304 for air and water penetration.

The invention as embodied by frame 12 further complies with many American Society of Testing and Materials (ASTM) testing procedures including the following: E547, E283, E330, E331, E987, E998, E1300, C1036, C1048, E413, E1886, E1996, F1233, F1642 and C1172. It also meets the Architectural Manufacturers Association (AAMA) 101/I.S.2, The American National Standards (ANSI) 297.1, and Underwriters Laboratory UL-752 and UL-972.

In regard to hurricanes and extreme windstorms the invention is intended to meet the design requirements of the International Building Code (formerly BOCA National Building Code), and in particularly Section 4 of the GUIDE (pages 33-38). In regard to Ballistics and Forced Entry environments the invention is intended to meet UL 752 Ballistic, UL 972 Forced Entry, and C 1172 Standard Specification for Laminated Architectural Flat Glass.

Referring now to FIG. 6 and FIG. 7, FIG. 6 shows a perspective view of the panel 10 having a right angle flange 12 inserted in channel 20 creating the four inch setback position, and having building materials arranged adjacent to the panel 10. FIG. 7 shows a top view of

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

panel 10 having the right angle flange 12 inserted into channel 20 and shows the placement of moisture barrier materials 74, 80 and sealant points 84, 85. In FIG. 6, two sections of foam insulation blocks 70, 72 are located adjacent to panel 10 and extend from the outer end section 34 back to the right-angle face of the flange 12. The opposite side of the flange 12 abuts sheathing 76 of the building structure which is attached to framing material 78 such as metal or wood. One side of the framing material 78 abuts the panel 10. Moisture barrier material 74 extends along the flange 12, and then crosses over the edge of flange 12 and runs along the sheathing 76. The moisture barrier material 80 extends from the rear side 23 of panel 10 and along the framing material 78. The moisture barrier materials 74, 80 seal out moisture from entering the building or areas within the building, and such materials are well known in the art of building construction.

FIG. 7 shows the location of the moisture barrier materials 74, 80 along the panel 10 to prevent moisture from entering a building structure where the panel 10 forms a frame 18 in an opening of the building. The moisture barrier material 74, 80 commonly known in the

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

art may be embodied by window and door flashing, manufactured by Carlisle Coatings of Sapulpa, Oklahoma 74067. For complete sealing of a frame 18 using panels 10 and flange 12, caulking is required at certain points 21, 23 to seal joint openings where air and moisture can enter. The caulking or sealant may be embodied by Model No. 795, manufactured by Dow Corning Corp., of Midland, Michigan 48686.

Referring to FIG. 1, FIG. 5 and FIG. 7, a nonconducting section 32 of the panel 10 is located between the channel 26 and the outer end section 34 of the panel 10. The outer end section 34 has a threaded inner area 36 for receiving screws which may be used to mount a pressure cap bracket to the end section 34 of the panel 10. The threaded inner area 36 of outer end section 34 provides for receiving a screw 48 to secure for example, a top panel 10_2 to a side panel 10_3 as shown in FIG. 5. Panel 10 comprises a first slot 37 running parallel to channel 20 and a second slot 39 running parallel between channel 20 and 26, each slot 37, 39 being threaded to receive screws to secure, for example, both panels 10_2 and 10_3 in a right angle configuration. The nonconductive section 32 may be embodied by a thermal

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

nonconductive material such as urethane manufactured by AZON USA Inc., of Kalamazoo, Michigan 49004.

Referring now to FIGS. 8, 9 and 10, the method of making the panel 10 is illustrated in three steps. FIG. 8 is a top view of the panel 10 after it is formed in a first step by an extrusion process commonly known in the art. A path of thermal conductive material, e.g. aluminum, extends from one end to the other end of panel 10 thereby providing a continuous thermally conductive path. FIG. 9 is a top view of the panel 10 after the second step of inserting a thermally nonconductive material 32 employing a resin and a hardener commonly known in the art such as urethane, into a space or slot 31 along the complete length of the panel 10. The urethane hardens after being inserted in slot 31. FIG. 10 shows a top view of the panel 10 after the third step of cutting away the thermally conductive material from directly above the thermally nonconductive material 32 creating a space 33. Any thermal energy at the outer end section 34 (near the outside of a building) cannot be conducted to the remainder of the panel 10 (within the building) because there is no longer a thermally conductive path from one end to the other. The urethane

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

32 provides a solid thermally nonconductive connection or a thermal block between the outer end section 34 and the remainder of the panel 10. In addition to urethane, other nonconducting solid materials may be employed such as any structural thermal break meeting or exceeding the following specifications:

Tensile (psi):	6000+/-1000 psi
Elongation (%):	20
Notched Izod (pli):	1.5 ft.lb/in minimum
Heat Distortion:	140°F
Hardness:	78 +/-2
Modulas of Elasticity:	240,000 + psi
Impact Strength:	10.9 ft.lb./in^2
Thermal Conductivity:	0.0913 BTU/hr.ft.°F 1.095 BTU in/hr ft^2 °F
Coefficient of Linear Thermal Expansion:	9.34 x 10^{-5} in/in°F

The panel 10 may be embodied with tempered aluminum such as 6063-T5 alloy commonly used in the art for storefront and curtainwall extrusions, reinforced plastic materials such as vinyl, and fiberglass. In the preferred embodiment, the width of the panel 12 is approximately six inches which provides sufficient space for channels 20, 26 which receive flanges 12, 14. The

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

width of the flanges 12, 14, 16 is approximately 1-5/16 inches. These dimensions may vary depending on building structure applications. The depth of the panel 10 is typically 1/8 inch for one to three story buildings and 3/16 inch for buildings four stories and up.

Referring to FIG. 11, a view of a panel 10 according to the present invention is shown comprising a bracket 90 attached to the outer end section 34 by a plurality of screws 94. The outer end section 34 comprises threads for receiving screws 94. A pressure cap 92 snaps over the bracket 90 on a finished structure. The panel 10 comprises in addition to channels 20, 26, first slot 37 and second slot 39 which have threads for receiving screws to secure the panel sections 10_1, 10_2, 10_3 and 10_4 at right angles to form the frame 18 as illustrated in FIG. 5.

Referring to FIG. 12, a top view of the panel 10 is shown having the right-angle flange 12 of FIG. 2 inserted into channel 26 to provide a one inch setback. The one-inch setback is measured from reference point "S" to the flange 12. Point "S" is located approximately one-quarter inch from the front edge 35 of the outer end section 34. This one-quarter inch spacing is a window

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

adjustment line which provides space for face cap and glazing components of a building. Section 42 of flange 12 is located adjacent to retainer edge 30 of channel 26.

Referring to FIG. 13, a top view of panel 10 is shown having the right-angle flange 12 of FIG. 2 inserted into channel 26 to provide a two inch setback from reference point "S" of panel 10. In this orientation, section 42 of flange 12 is located adjacent to retainer edge 28 of channel 26.

Referring to FIG. 14, a top view of panel 10 is shown having the right-angle flange 12 of FIG. 2 inserted into channel 20 to provide a three inch setback from reference point "S" of panel 10. In this orientation, section 42 of flange 12 is located adjacent to retainer edge 24 of channel 20.

Referring to FIG. 15, a top view of panel 10 is shown having the right-angle flange 12 of FIG. 2 inserted into channel 20 to provide a four inch setback from reference point "S" of panel 10. In this orientation, section 42 of flange 12 is located adjacent to retainer edge 22 of channel 26.

Referring to FIG. 16, a top view of panel 10 is shown having the offset right-angle flange 14 of FIG. 3

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

inserted into channel 20 to provide a five inch setback from reference point "S" of panel 10. In this orientation the off-set portion 52 of flange 14 is located adjacent to retainer edge 22 of channel 20.

Referring to FIG. 17, a top view of panel 10 is shown having the offset right-angle flange 14 of FIG. 3 inserted into channel 26 to provide effectively no setback from the reference point "S" of panel 10. In this orientation section 52' of flange 14 is located adjacent to retainer edge 30 of channel 26.

Referring to FIG. 18, an end view of panel 10 is shown positioned in a horizontal plane having the sill flange 16 of FIG. 4 inserted into the channel 26 to provide a surface for a sill of a window frame 18 as shown in FIG. 5 which extends in front of the frame 18. The various flanges 12, 14, 16 provide great flexibility for universal applications in openings of different building structures.

This invention has been disclosed in terms of certain embodiments. It will be apparent that many modifications can be made to the disclosed apparatus without departing from the invention. For example, the flexibility of the flanges 12, 24 providing for setbacks

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971

in one inch increments can be varied for other setback differences by varying the position of section 42 along section 40 on flange 12 and likewise varying the position of offset section 52 along section 50 of flange 14. Further, the flange 12 may comprise more than one right angle section 42 extending from section 40 depending on building design requirements. Therefore, it is the intent of the appended claims to cover all such variations and modifications as come within the true spirit and scope of this invention.

PEARSON & PEARSON, LLP
PATENT ATTORNEYS
GATEWAY CENTER
10 GEORGE STREET
LOWELL, MA 01852
(978) 452-1971